

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Chang-Seob KIM et al.

Application No.: 10/748,197

Group Art Unit: 1745

Filed: December 31, 2003

Examiner: Maria J. Laios

For: JELLY-ROLL TYPE BATTERY UNIT AND WINDING METHOD THEREOF AND
LITHIUM SECONDARY BATTERY COMPRISING THE SAME

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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Commissioner for Patents
PO Box 1450
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Sir:

Pursuant to the Appellant's Notice of Appeal on January 29, 2008, Appellant hereby appeals to the Board of Patent Appeals and Interferences from the final rejection mailed November 1, 2007, in the above-identified application. Appellant submits this Appeal Brief, along with the filing fee of \$500.00 set forth in 37 C.F.R. §41.20(b)(2).

Also enclosed is a Claims Appendix in compliance with 37 C.F.R. § 41.37(c)(1)(viii). An Evidence Appendix in compliance with 37 C.F.R. § 41.37(c)(1)(ix) is enclosed and indicated as being NONE. A Related Proceedings Appendix in compliance with 37 C.F.R. § 41.37(c)(1)(x) is enclosed and indicated as being NONE.

I. Real Party in Interest

Due to the assignment executed on December 19, 2003, by the inventors Chang-Seob Kim, Ju-Hyung Kim, Min-Ho Song, and Jun-Won Kang, and recorded in the United States Patent and Trademark Office at Reel 014854, Frame 0548, the real party in interest is as follows:

Samsung SDI Co., Ltd.
575 Sin-dong, Yeongtong-gu,
Suwon-Si, Gyeonggi-do
Republic of Korea

II. Related Appeals and Interferences

Although the real party in interest has other appeals and interferences, none of the other pending appeals and interferences is believed to directly affect or be directly affected by, or have any bearing upon the decision of the Board of Patent Appeals and Interferences in this appeal.

III. Status of Claims

The status of the claims of the application is as follows:

Claims 1 – 8, 10, 12-28: rejected.

Claims 9 and 11: canceled.

In view of the Amendment under 37 CFR 41.33, filed March 27, 2008, to cancel claims 16-19 and make claim 20 independent, Claims 1-8, 10, 12-15, and 20-28 are the subject of this appeal.

IV. Status of Amendments

Claims 1 – 8, 10, and 20-28 were rejected in the final Office Action, mailed November 1, 2007.

The amendment included in the Applicants' response dated December 27, 2007, to final Office Action, were entered by the Examiner.

On filed March 27, 2008, an Amendment under 37 CFR 41.33 was filed cancelling claims 16-19 and making claim 20 independent. However, the Examiner has not confirmed entry of this Amendment.

A copy of the claims involved in the appeal is included in the Claims Appendix and reflects the claims as of the filing of the Amendment under 37 CFR 41.33.

V. Summary of the claimed subject matter

Aspects of the present invention are directed to a jelly-roll type battery unit. In particular, the jelly-roll type battery unit, according to independent claim 1, comprises: a first electrode plate (FIG. 5; page 7, line 13) having a first electrode current collector (FIG. 5; page 8, line 1), with a first electrode tab (FIG. 5; page 8, lines 5-6), and a first electrode active material layer coated on at least one surface of the first electrode current collector (FIG. 5; page 8, lines 2-3);

a second electrode plate (FIG. 5; page 7, lines 12-13) having a second electrode current collector (FIG. 5; page 7, lines 15-16) with a second electrode tab (FIG. 5; page 7, lines 19-20), and a second electrode active material layer coated on at least one surface of the second electrode current collector (FIG. 5; page 7, lines 16-17); and

a separator that is interposed between the first electrode plate and the second electrode plate (FIG. 5; page 7, lines 13-14), wherein the first or second electrode tab is formed by folding a cut portion of the first or second electrode current collector toward an upper edge thereof (FIG. 5; page 8, lines 13-20), and the cut portion is at least partially defined by a cut that begins at a lower edge of the first or second electrode current collector and extends along more than half of a width thereof (FIG. 6B; page 10, lines 1-6).

Aspects of the present invention are directed to a method of winding a jelly-roll type battery unit. In particular, according to claim 8, the method comprises: forming a first electrode plate having a first electrode current collector (FIG. 6A; page 9, lines 15-16) with a first electrode tab formed at a winding start portion of the first electrode current collector (FIG. 6A; page 9, lines 19-20), wherein the first electrode tab is formed by folding a cut portion of the first electrode current collector toward an upper edge thereof (FIG. 6C; page 10, lines 7-8), and the cut portion is at least partially defined by a cut that begins at a lower edge of the electrode current collector and extends along more than half of a width thereof (FIG. 6B; page 10, lines 3-4);

forming a second electrode plate having a second electrode current collector (FIG. 7; page 11, lines 17-18) with a second electrode tab attached thereto (FIG. 7; page 11, lines 18-20);

preparing a separator interposed between the first and second electrode plates (FIG. 7; page 11, lines 17-18); and

winding the first and second electrode plates together with the separator interposed therebetween (FIG. 7; page 11, lines 25-27).

The lithium secondary battery, according to independent claim 14, comprises: a battery unit (FIG. 5; page 7, line 11) having a first electrode plate (FIG. 5; page 7, line 13) having a first electrode tab (FIG. 5; page 8, lines 5-6), a separator and a second electrode plate of an opposite polarity to the first electrode plate (FIG. 5; page 7, lines 12-14), the second electrode plate (FIG. 5; page 7, lines 12-13) having a second electrode tab (FIG. 5; page 7, lines 19-20), sequentially disposed;

a can having a space in which the battery unit is housed (FIG. 4; page 6, lines 15-16); and

a cap assembly connected to an upper portion of the can (FIG. 3; page 6, lines 3-5), and having a cap plate (FIG. 4; page 6, lines 20-21) and an electrode terminal connected to the cap plate through a terminal throughhole formed in the cap plate (FIG. 4; page 6, lines 24-25) and having a gasket at an outer surface for insulation from the cap plate (FIG. 4; page 6, lines 25-27), wherein the first electrode plate includes a first electrode current collector (FIG. 5; page 7, line 13) having a first electrode tab (FIG. 5; page 8, lines 5-6) formed by folding a cut portion of the first electrode current collector toward an upper edge thereof (FIG. 6C; page 10, lines 7-8), the cut portion being at least partially defined by a cut that begins at a lower edge of the first electrode current collector and extends along more than half of a width of the first electrode current collector (FIG. 6B; page 10, lines 3-4), and a first electrode active material coated on at least one plane of the first electrode current collector (FIG. 5; page 8, lines 2-3), and the second electrode plate includes a second electrode current collector (FIG. 5; page 7, lines 15-16) with a second electrode tab attached thereto (FIG. 5; page 7, lines 19-20), and a second electrode active material coated on at least one plane of the second electrode current collector (FIG. 5;

page 7, lines 16-17).

Aspects of the present invention are directed to a jelly-roll type battery unit. In particular, according to the aspect recited in claim 20, the jelly-roll type battery unit comprises: a first tri-functional electrode unit (FIGs. 5 and 7; page 13 lines 21-22) comprising a first plate having a first electrode current collector with a first electrode tab, and a first electrode active material layer coated on at least one surface of the first electrode current collector (FIGs. 5 and 7; page 13 lines 27-29);

a second tri-functional electrode unit (FIGs. 5 and 7; page 13 line 23) comprising a second electrode plate having a second electrode current collector with a second electrode tab, and a second electrode active material layer coated on at least one surface of the second electrode current collector (FIGs. 5 and 7; page 13 lines 30-33); and

a separator interposed between the first tri-functional electrode unit and the second tri-functional electrode unit (FIGs. 5 and 7; page 13 lines 22-25), wherein, the first tri-functional electrode unit and the second tri-functional electrode unit are wound, with the separator therebetween, to form the battery unit (FIGs. 5 and 7; page 13 lines 24-25), the separator is interposed between the first electrode plate and the second electrode plate (FIGs. 5 and 7; page 13 lines 33-34), the first or the second electrode tab is incorporated into the electrode current collector in an area of either the first or the second electrode plate where the corresponding electrode active material layer is not coated (FIGs. 5 and 7; page 13 lines 33-36), and the first or the second electrode tab is formed by folding a cut portion of the first or second electrode current collector toward an upper edge thereof (FIG. 6C; page 10, lines 7-8), the cut portion being defined by a cut that begins at a lower edge of the first or second electrode current collector and extends along more than half of a width thereof (FIG. 6B; page 10, lines 3-4).

The patentability of dependent claims 5, 6, 12, 21-22, 27, and 28 are separately argued below. Claim 5 further recites an insulating tape adhered to either surface of the first or the second electrode tab (FIG. 6A; page 9, lines 10-11).

Claim 6 depends from claim 5, and further recites that the insulating tape is interposed between inner and outer surfaces of the first or the second electrode tab that is folded upward (FIG. 6C; page 10 lines 17-22).

Claim 12 depends from claim 8, and further includes an insulating tape adhered to either surface of the first electrode current collector having the first electrode tab (FIG. 7; page 11, lines 9-12).

Claim 21 depends from claim 20, and recites an insulating tape adhered to either surface of the first or the second electrode tab (FIG. 6A; page 9, lines 10-11). Claim 22 depends from claim 21, and further recites that the insulating tape is interposed between the inner and outer surfaces of the first or the second electrode tab that is folded upward (FIG. 6C; page 10 lines 17-22).

Claim 27 depends from claim 4, and recites a jelly-roll type battery unit including a plurality of insulating tapes attached to both surfaces of the electrode current collector having an electrode tab incorporated therein (FIG. 6A; page 9, lines 10-11) to prevent an electrical short-circuit between electrode plates of opposite polarities during assembling of the battery unit (FIG. 5; page 8, lines 21-25).

Claim 28 depends from claim 27, and recites that the plurality of insulating tapes are attached to both surfaces of an electrode tab formed by cutting an electrode current collector and folding an end portion of the electrode current collector up prevent electrical short-circuit due to burring of the electrode tab (FIG. 5; page 8, lines 21-25).

VI. Grounds of rejection

The following is a concise statement of each ground of appeal.

1. Whether claims 1-4, 7, 8, 10, 13-15, 20, and 23-26 are patentable under 35 U.S.C. §103, over Sugita et al. (U.S. Patent No. 6,432,587 B1); and
2. Whether claims 5, 6, 12, 21, 22, 27, and 28 are patentable 35 U.S.C. §103(a), as being unpatentable over Sugita et al. (U.S. Patent 6,432,578 B1), and further in view of Narukawa et al. (U.S. Patent 5,508,122).

VII. Arguments

1. **Claims 1, 14, and 20 are patentably distinguishable over Sugita et al. (U.S. Patent No. 6,432,578).**

A. There is insufficient evidence of record of a rationale to modify Sugita et al., in a manner meeting the invention as recited in claims 1, 14, and 20.

By way of review, in relevant parts claims 1, 14, and 20 recite that an electrode tab formed by folding a cut portion of an electrode current collector toward an upper edge thereof, the cut portion being at least partially defined by a cut that begins at a lower edge of the electrode current collector, and extends along more than half of a width of the electrode current collector. As is admitted by the Examiner, at page 4, lines 11-12, of the Office Action mailed on November 01, 2007, Sugita et al. does not teach or suggest that the cut portion begins at the lower edge of the electrode current collector, and extends along more than half of a width thereof.

Therefore, on page 4 of the Office Action, the Examiner argued that it would have been obvious to one of ordinary skill in the art at the time of the invention, to cut from the edge of the electrode, and folding the cut portion toward the upper edge, in order to form the tab, because Sugita et al. discloses a cut portion in the center of the electrode, but it would have been easier to manufacture the tab, if the cut was made at the lower edge, and then folded up. For the following reasons, Applicants respectfully disagree.

Applicants agree that one skilled in the art may be motivated to modify a device, order to overcome manufacturing difficulties. In fact, such a statement could be applied to any device, as a motivation for modification. However, "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *See In re Kahn*, 441 F. 3d 977, 988 (Fed. Cir. 2006).

The Examiner has not cited any manufacturing difficulties associated with manufacturing

an electrode tab of Sugita et al. In fact, nowhere in Sugita et al. are manufacturing difficulties associated with incising the electrode tab discussed. Without establishing any manufacturing difficulties or factual bases therefore, there can be no evidence of a motivation to overcome such difficulties, and the Examiner's argument must be considered a conclusory statement unsupported by the record. Therefore, the Examiner has not provided evidence that one skilled in the art would have modified Sugita et al., in order to ease manufacturing, and the rejection of claims 1–4, 7, 14, 15, 20, and 23 – 26, under 35 U.S.C. §103, over Sugita et al., should be reversed.

B. The differences between the invention as recited in claims 1, 14, and 20 and Sugita et al. are not obvious, even if there was a motivation to modify the invention of Sugita et al.

Assuming, *arguendo*, that one skilled in the art would be motivated to modify the electrode tab of Sugita et al., in order to overcome manufacturing difficulties, the invention as recited in claims 1 and 14 is not an obvious modification of Sugita et al. For the following reasons, Applicants also respectfully submit that the Examiner is impermissibly using hindsight to arrive at the modifications necessary to render the claimed invention obvious.

"When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." See *Teleflex v. KSR*, 127 S.Ct. 1743, (2007). However, there are innumerable ways in which an electrode tab can be formed. For example, at column 8, lines 64 – 67, the incised portion is recited to have various shapes, such as, "a U-shape, a V-shape, a trapezoidal shape wherein one of its sides is at right angles to the upper side and the lower side, or a shape with round corners...." In addition, at column 14, lines 16 – 19, the electrode tab is recited to possibly not be formed by a folded incised portion, but rather, can be an additional piece that is spot welded to the electrode body. Given the evidence of multiple mechanisms by which the electrode tab can be formed, there is a lack of evidence as to the finite number of solutions to achieve a common solution as was the case in

Teleflex v. KSR.

In view of the extensive above-mentioned variations of an electrode tab, Applicants respectfully assert that, if the presently claimed configuration was obvious or would have been advantageous, it would have surely been included as an example, as Sugita et al. seems to include all the variations known at the time. Moreover, such extensive variations demonstrate that there were not a limited number of ways to implement the electrode tabs in Sugita et al. Therefore, the fact that the presently claimed electrode tab was not disclosed in Sugita et al. is evidence that the presently claimed invention was not obvious in view of the teachings of Sugita et al.

As the Examiner has not provided any teaching or rationale evidencing the particular modifications of the electrode tab of Sugita et al., which would result in the claimed invention, Applicants are left to presume that the Examiner impermissibly used hindsight to provide such a rationale. Therefore, the rejection of claims 1–4, 7, 14, 15, 20, and 23 – 26, under 35 U.S.C. §103, over Sugita et al., should be reversed, for these additional reasons.

2. Claim 8 is patentably distinguishable over Sugita et al. (U.S. Patent No. 6,432,578).

A. There is insufficient evidence of record of a motivation to modify Sugita et al., in a manner meeting the invention as recited in claim 8.

As reviewed, in part, independent claim 8 relates to method of winding a jelly-roll type battery unit comprising: forming a first electrode tab by folding a cut portion of the first electrode current collector toward an upper edge thereof, and the cut portion is at least partially defined by a cut that begins at a lower edge of the electrode current collector and extends along more than half of a width thereof. As is admitted by the Examiner, at page 4, lines 11-12, of the Office Action mailed on November 01, 2007, Sugita et al. does not teach or suggest that the cut portion begins at the lower edge of the electrode current collector, and extends along more than half of a width thereof.

Therefore, on page 4 of the Office Action, the Examiner argued that it would have been

obvious to one of ordinary skill in the art at the time of the invention, to cut from the edge of the electrode, and fold the cut portion toward the upper edge, in order to form the tab, because while Sugita et al. discloses a cut portion in the center of the electrode, it would have been easier to manufacture the tab, if the cut was made at the lower edge, and then folded up. For the following reasons, Applicants respectfully disagree.

Applicants agree that one skilled in the art may be motivated to modify a device, order to overcome manufacturing difficulties. In fact, such a statement could be applied to any device, as a motivation for modification. However, "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." See *In re Kahn*, 441 F. 3d 977, 988 (Fed. Cir. 2006).

The Examiner has not cited any manufacturing difficulties associated with manufacturing an electrode tab of Sugita et al. In fact, nowhere in Sugita et al. are manufacturing difficulties associated with incising the electrode tab discussed. Without reciting any particular manufacturing difficulties or evidence of the existence thereof, there can be no evidence of a rationale or motivation to overcome such difficulties, and the Examiner's argument must be considered a conclusory statement. Therefore, the Examiner has not provided evidence that one skilled in the art would have been motivated to modify Sugita et al., in order to ease manufacturing, and the rejection of claims 8, 10, and 13, under 35 U.S.C. §103, over Sugita et al., should be reversed.

B. The differences between the invention as recited in claim 8 and Sugita et al. are not obvious, even if there was a motivation to modify the invention of Sugita et al.

Assuming, *arguendo*, that one skilled in the art would be motivated to modify the electrode tab of Sugita et al., in order to overcome manufacturing difficulties, the invention as recited in claim 8 is not an obvious modification of Sugita et al. For the following reasons, Applicants also respectfully submit that the Examiner is impermissibly using hindsight to modify

Sugita et al., in order to anticipate the presently claimed invention.

“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.” See *Teleflex V. KSR*, 127 S.Ct. 1743, (2007). However, there are innumerable ways in which an electrode tab can be formed. For example, at column 8, lines 64 – 67, the incised portion is recited to have various shapes, such as, “a U-shape, a V-shape, a trapezoidal shape wherein one of its sides is at right angles to the upper side and the lower side, or a shape with round corners....” In addition, at column 14, lines 16 – 19, the electrode tab is recited to possibly not be formed by a folded incised portion, but rather, can be an additional piece that is spot welded to the electrode body. Given the evidence of multiple mechanisms by which the electrode tab can be formed, there is a lack of evidence as to the finite number of solutions to achieve a common solution as was the case in *Teleflex v. KSR*.

In view of the extensive above-mentioned variations of an electrode tab, Applicants respectfully assert that, if the presently claimed configuration was obvious or would have been advantageous, it would have surely been included as an example, as Sugita et al. seems to include all the variations known at the time. Moreover, such extensive variations demonstrate that there were not a limited number of ways to implement the electrode tabs in Sugita et al. Therefore, the fact that the presently claimed electrode tab was not disclosed in Sugita et al. is evidence that the presently claimed invention was not obvious in view of the teachings of Sugita et al.

As the Examiner has not provided any teaching or evidence showing the particular modifications of the electrode tab of Sugita et al. or advantages to the use thereof, which would result in the claimed invention, Applicants are left to presume that the Examiner impermissibly used hindsight to provide such a motivation as the record does not otherwise provide such an explanation. Therefore, the rejection of claim 8 and dependent claims 10 and 13, under 35

U.S.C. §103, over Sugita et al., should be reversed.

2. Claims 5, 6, 12, 21, 22, 27, and 28 are patentably distinguishable under 35 U.S.C. §103(a), over Sugita et al. (U.S. Patent 6,432,578 B1), in view of Narukawa et al. (U.S. Patent 5,508,122).

Claims 5, 6, and 27- 28 depend from claim 1, claim 12 depends from claim 8, and claims 21 and 22 depend from claim 20. The additionally cited references do not overcome the deficiencies of the Examiner's rejection of claims 1, 8, and 20, as discussed above. In addition, the rejection of claims 5, 6, 12, 21, 22, 27, and 28 should be overturned for the following additional reasons.

At page 5, of the Office Action of mailed on November 1, 2007, the Examiner admits that Sugita et al. fails to teach the use of an insulating tape to adhere the electrode tab. However, the Examiner asserts it would have been obvious to combine the electrode tapes allegedly taught in Narukawa et al., with the teachings of Sugita et al., to arrive at the presently claimed invention, because such a combination would assure that each lead would not touch another electrode.

Applicants respectfully assert that not only is there no motivation or evidence of record that supports such a combination, and Sugita et al. actually teaches away from such a combination. In addition, such a combination would destroy the functionality of the apparatus of Sugita et al. For example, at column 4, lines 64 – 67, and column 5, lines 1 – 4, Sugita et al. discloses that it is preferable not to use adhesive tape in the terminal portion, because this may cause a decrease in working efficiency and unexpected chemical reactions. In addition, at column 8, lines 28 – 34, Sugita et al. teaches that a bent portion of the electrode tab “extends in the direction of the bottom of the cell outer can....” As such, the use of electrode tape to secure the electrode tab would prevent the extension of the electrode tab, destroying the ability of the disclosed electrode tab to decrease the movement of the electrode body, and in addition, would increase manufacturing difficulty with no discernable benefit. Therefore, one skilled in the art

would not be motivated to combine the teachings of Sugita et al. and Narukawa et al., through the use of the tape, in view of Sugita et al.'s specific teaching to not use the tape, and to instead rely on the shown bent portion.

Therefore, the rejection of claims 5, 6, 12, 21, 22, 27, and 28, under 35 U.S.C. §103(a), as being unpatentable over Sugita et al. (U.S. Patent 6,432,578 B1), in view of Narukawa et al. (U.S. Patent 5,508,122), should be reversed.

VIII. Conclusion

In view of the law and facts stated herein, the Appellant respectfully submits that the Examiner has failed to cite a reference or combination of references sufficient to maintain obviousness rejections of the rejected claims and has failed to rebut the arguments in the Response dated December 27, 2007 and in the applicants' previous responses.

For all the foregoing reasons, the Appellant respectfully submits that the cited prior art does not teach or suggest the presently claimed invention. The claims are patentable over the prior art of record and the Examiner's findings of unpatentability regarding claims 1-8, 10, 12-13, 14-15, and 24-28 should be reversed.

The Commissioner is hereby authorized to charge any additional fees required in connection with the filing of the Appeal Brief to our Deposit Account No. 50-3333.

Respectfully submitted,

STEIN, MCEWEN & BUI LLP

Date: 3/31/2008

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IX. Claims Appendix

1. A jelly-roll type battery unit comprising:

a first electrode plate having a first electrode current collector with a first electrode tab, and a first electrode active material layer coated on at least one surface of the first electrode current collector;

a second electrode plate having a second electrode current collector with a second electrode tab, and a second electrode active material layer coated on at least one surface of the second electrode current collector; and

a separator that is interposed between the first electrode plate and the second electrode plate, wherein the first or the second electrode tab is incorporated into the electrode current collector in an area of either the first or the second electrode plate where the corresponding electrode active material layer is not coated,

wherein the first or second electrode tab is formed by folding a cut portion of the first or second electrode current collector toward an upper edge thereof, and the cut portion is at least partially defined by a cut that begins at a lower edge of the first or second electrode current collector and extends along more than half of a width thereof.

2. The jelly-roll type battery unit of claim 1, wherein the first or the second electrode tab is disposed at a winding start portion of the electrode current collector.

3. The jelly-roll type battery unit of claim 1, wherein the first or the second electrode tab is disposed at a winding completion portion of the electrode current collector.

4. The jelly-roll type battery unit of claim 1, wherein the first or the second electrode tab extends past the upper edge of the first or second electrode current collector.

5. The jelly-roll type battery unit of claim 1, further comprising an insulating tape adhered to either surface of the first or the second electrode tab.

6. The jelly-roll type battery unit of claim 5, wherein the insulating tape is interposed between inner and outer surfaces of the first or the second electrode tab that is folded upward.

7. The jelly-roll type battery unit of claim 4, wherein the first or the second folded electrode tab partially overlaps with the electrode current collector having the opposite polarity.

8. A method of winding a jelly-roll type battery unit comprising:

forming a first electrode plate having a first electrode current collector with a first electrode tab formed at a winding start portion of the first electrode current collector, wherein the first electrode tab is formed by folding a cut portion of the first electrode current collector toward an upper edge thereof, and the cut portion is at least partially defined by a cut that begins at a lower edge of the electrode current collector and extends along more than half of a width thereof;

forming a second electrode plate having a second electrode current collector with a second electrode tab attached thereto;

preparing a separator interposed between the first and second electrode plates; and

winding the first and second electrode plates together with the separator interposed therebetween.

10. The method of claim 8, wherein an end of the first electrode tab is exposed above the upper edge of the first electrode current collector.

12. The method of claim 8, further comprising an insulating tape adhered to either surface of the first electrode current collector having the first electrode tab.

13. The method of claim 8, wherein the first electrode tab is wound to partially overlap another electrode current collector having an opposite polarity .

14. A lithium secondary battery comprising:

a battery unit having a first electrode plate having a first electrode tab, a separator and a second electrode plate of an opposite polarity to the first electrode plate, the second electrode plate having a second electrode tab, sequentially disposed;

a can having a space in which the battery unit is housed; and

a cap assembly connected to an upper portion of the can, and having a cap plate and an electrode terminal connected to the cap plate through a terminal throughhole formed in the cap plate and having a gasket at an outer surface for insulation from the cap plate, wherein the first electrode plate includes a first electrode current collector having a first electrode tab formed by folding a cut portion of the first electrode current collector toward an upper edge thereof, the cut portion being at least partially defined by a cut that begins at a lower edge of the first electrode

current collector and extends along more than half of a width of the first electrode current collector, and a first electrode active material coated on at least one plane of the first electrode current collector, and the second electrode plate includes a second electrode current collector with a second electrode tab attached thereto, and a second electrode active material coated on at least one plane of the second electrode current collector.

15. The lithium secondary battery of claim 14, wherein the first electrode tab is disposed in an area where an electrode active material layer is not coated and extends above the upper edge of the first electrode current collector.

20. A jelly-roll type battery unit, comprising:

a first tri-functional electrode unit comprising a first plate having a first electrode current collector with a first electrode tab, and a first electrode active material layer coated on at least one surface of the first electrode current collector;

a second tri-functional electrode unit comprising a second electrode plate having a second electrode current collector with a second electrode tab, and a second electrode active material layer coated on at least one surface of the second electrode current collector; and

a separator interposed between the first tri-functional electrode unit and the second tri-functional electrode unit, wherein,

the separator is interposed between the first electrode plate and the second electrode plate,

the first tri-functional electrode unit and the second tri-functional electrode unit are wound, with the separator therebetween, to form the battery unit,

the first or the second electrode tab is incorporated into the electrode current collector in an area of either the first or the second electrode plate where the corresponding electrode active material layer is not coated, and

the first or the second electrode tab is formed by folding a cut portion of the first or second electrode current collector toward an upper edge thereof, the cut portion being defined by a cut that begins at a lower edge of the first or second electrode current collector and extends along more than half of a width thereof.

21. The jelly-roll type battery unit of claim 20, further comprising an insulating tape adhered to either surface of the first or the second electrode tab.

22. The jelly-roll type battery unit of claim 21, wherein the insulating tape is interposed between the inner and outer surfaces of the first or the second electrode tab that is folded upward.

23. The jelly-roll type battery unit of claim 20, wherein the first or the second folded electrode tab partially overlaps with the electrode current collector having the opposite polarity.

24. The jelly-roll type battery unit of claim 2, wherein the portion of the electrode current collector that is cut and folded upward prevents deformation of the jelly-roll type battery unit.

25. The jelly-roll type battery unit of claim 2, wherein material cost of the jelly-roll type battery unit is minimized by cutting a portion of the winding start portion and folding upward to form the first or the second electrode tab.

26. The jelly-roll type battery unit of claim 2, wherein the portion of the electrode current collector that is cut and folded upward as the first or the second electrode tab prevents an increase in internal resistance due to use of an electrode tab made of different metals.

27. The jelly-roll type battery unit of claim 4, further including a plurality of insulating tapes attached to both surfaces of the electrode current collector having an electrode tab incorporated therein to prevent an electrical short-circuit between electrode plates of opposite polarities during assembling of the battery unit.

28. The jelly-roll type battery unit of claim 27, wherein the plurality of insulating tapes are attached to both surfaces of an electrode tab formed by cutting an electrode current collector and folding an end portion of the electrode current collector up prevent electrical short-circuit due to burring of the electrode tab.

SERIAL NO. 10/748,197

DOCKET NO. 1568.1079

X. Evidence Appendix

NONE

SERIAL NO. 10/748,197

DOCKET NO. 1568.1079

XI. Related Proceedings Appendix

NONE